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CANADIAN PATENT

⑤

**PROCESS FOR PRODUCING A LOW DENSITY, LOOSELY
BONDED FLUFF BATT OF INDIVIDUAL, KINKED AND
INTERLOCKED FIBERS**

⑦

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PROCESS FOR PRODUCING A LOW DENSITY,
LOOSELY BONDED FLUFF BATT OF INDIVIDUAL,
KINKED AND INTERLOCKED FIBERS

Abstract of the Disclosure

A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers characterized by improved strength and bulk. The improved process eliminates the conventional steps in producing such a batt which heretofore included the use of a paper machine for forming a paper sheet and fiberizing of the paper sheet to form a fluff batt and provides an improved batt of kinked and interlocked fibers. The process includes the steps of providing fibrous pulp material having a predetermined moisture content and comprising individual fibers having kinking and twisting characteristics when dried in an unrestricted state, fiberizing the wet pulp material to separate the individual fibers while maintaining the individual fibers separate from each other, drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other, and dry laying the fibers to form a low density fluff batt.

PROCESS FOR PRODUCING A LOW DENSITY,
LOOSELY BONDED FLUFF BATT OF INDIVIDUAL,
KINKED AND INTERLOCKED FIBERS

This invention relates to a process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers which is characterized by improved strength and bulk.

Fluff batts of fiber have heretofore been utilized in a wide range of products including the core material for sanitary products, such as diapers, sanitary napkins, etc., for providing absorbency and other characteristics in the sanitary products. These fluff batts have also been utilized in the manufacture of various other products including padding for packaging material, upholstery, etc., where the fluff batt may or may not be blended with other fibers. The fluffed fibers have also been utilized for the forming of paper including writing paper and other types of paper and have been utilized as fillers for rubber and plastic products and for the manufacture of building boards including wall and ceiling tiles.

Riegel Textile Corporation, the Assignee of the present invention, has previously made a number of inventions in the field of personal products, including diapers and sanitary napkins, composed of processed cellulose fibers, and has been granted a number of U. S. patents, including Patent Nos. 3,131,693; 3,171,773; 3,370,590; 3,407,814; 3,543,351; RE 26,939; 3,554,862; 3,554,863; 3,608,269; 3,636,952 and 3,669,800. Included among these inventions and patents of Riegel Textile Corporation is the formation of fluff batts of fibers for use as the interior cores or absorbent layers for these personal products, an illustrative example of which is the above mentioned U. S. Patent RE 26,939, issued August 18, 1970, to Hervey et al.



In the process for the formation of fluff batts of fibers disclosed in the aforesaid patent RE 26, 939 and other known conventional processes for the formation of fluff batts of fibers, it has been conventional to manufacture a wet-pressed pulp sheet by pulp and paper making processes, dry and wet-pressed sheet and then mechanically fiberized the dry pulp sheet into individual fibers and air-lay the individual fibers to form a fluff fibrous pulp batt. Inasmuch as these prior manufacturing operations included the use of a paper machine for the formation of the intermediate wet-pressed wood pulp sheet, which must be dried and subsequently
10 mechanically fiberized to form the fluff batt, it is necessarily an expensive manufacturing operation requiring extensive machinery. Also, the fluff fibrous batt formed by this process includes relatively straight and uninked or untwisted individual fibers which do not interlock with each other and therefore they do not provide optimum strength and stability when formed into a fluff batt.

Accordingly, it is the object of this invention to provide an improved process for producing a low density, loosely bonded, fluff batt which includes kinked and interlocked individual fibers for improving the strength and bulk of the batt and which eliminates the expensive process
20 step of forming an intermediate wet pressed and dried wood pulp sheet on a paper machine.

It has been found by this invention that the above object may be accomplished by providing a process which comprises basically the steps of providing fibrous pulp material having a predetermined moisture content and comprising individual fibers having kinking and twisting characteristics when dried in an unrestricted state, fiberizing the wet pulp material to separate the individual fibers while maintaining the

individual fibers separate from each other, drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other, and dry laying the fibers to form a low density fluff batt.

By any conventional pulp making and paper making technique, the fibers are essentially non-kinked. That is, they exist as straight fibers in the wood and after going through cooking and bleaching processes, are delivered to the paper making machine in essentially an unkinked form. Then, when they are formed into a sheet and dried, they are held in place by the structure of the sheet and essentially remain unkinked fibers in the dry sheet. Then, as in the case of fiberizing pulp, they are broken apart by mechanical means, the individual fibers obtained are still essentially unkinked. The air-laid batt formed of these fibers has relatively little strength and integrity. There is no bonding between dry fibers once separated and brought back into contact with one another and any type of stress put on the batt, such as handling or pulling, easily slides the fibers by one another resulting in breakage of the batt structure and the product utilizing same.

The present invention is applicable to practically all conventional types of fibrous pulp materials made in conventional manner by well-known kraft, soda, sulfite or neutral sulfite processes. All material, that is the fibers to be pulped, and otherwise processed in accordance with this invention, may be any one or more of the various types of pulped materials commercially used in paper and paper board manufacture. Illustrative examples are wood, cotton, linters, flax, hemp, ramie, bagasse, esparto fiber pulp, etc. These types of pulp materials have

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inherent kinking and twisting characteristics when dried in an unrestricted state. However, prior to this invention, these natural characteristics of the fibers have not been utilized in forming a fluff batt, as discussed above, since the fibers are dried in a restricted state and are held in place by the structure of the pressed wood pulp sheet formed on the paper machine.

10 In accordance with this invention, fibrous pulp material having a predetermined moisture content of approximately 30 per cent or more by weight is delivered, preferably from conventional cooking and bleaching processes, directly to fiberizing apparatus, rather than to a paper making machine which heretofore formed a wet-pressed and dried wood pulp sheet. The fiberizing apparatus utilized in this invention should be specialized fluffing or agitating equipment which will separate the individual fibers of the wet pulp material and maintain the individual fibers separate from each other.

20 It has been found by this invention that specialized commercially available fluid jet equipment which utilizes either air-jets or steam-jets is acceptable for the process of this invention by directing the jet of fluid directly on the wet pulp material for separating the fibers thereof from each other while maintaining the fibers separate from each other. This type of fluid jet equipment is disclosed in U. S. Patents 3,491,953 and 3,667,131 and is commercially available from the Fluid Energy Processing and Equipment Company of Lansdale, Pennsylvania and is also disclosed in U. S. Patent 2,991,946 and is commercially available from Majac, Inc. of Sharpsburg, Pennsylvania.

In selecting fiberizing apparatus for utilization in the process of this invention, it is important that apparatus be chosen which will prevent the individual fibers from twisting with each other during the fiberizing operation to form macrofibers which are not desired and which reduce the strength of the ultimately formed fluff batt.

The next step of the process of this invention comprises drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other. This step of the process may be performed directly in the fiberizing equipment by subjecting the separated and individual fibers to an air stream which may include a forced hot air stream at a temperature of about 400°F. Inasmuch as the fibers are in an unrestricted state in the fiberizing equipment, they will kink and untwist during drying due to these inherent characteristics of the fibers. The drying step may also be performed during a subsequent stage of the process of this invention, as will be discussed below.

The new step of the process of this invention comprises dry laying the fibers to form a low density fluffed batt. This dry laying of the fibers may be performed on any conventional equipment such as perforated moving screen, as disclosed in the U. S. Patent 3,268,954, issued August 30, 1966 or various other types of perforated moving screen air laying equipment presently commercially available. Also, the fibers may be dry laid by a conventional textile carding machine during which other fibers may be blended with the fibers of this invention for the formation of a batt suitable for use as padding material or the like. Accordingly, the term "dry laying" as used herein means laying of the fibers by use of air lay mechanism, carding machines, etc., as opposed

to wet laying by the use of a paper machine, etc.

The drying step of the process of this invention in which the separated individual fibers are dried in an unrestricted state to allow the fibers to kink and twist may be performed during the step of dry laying the fibers to form a low density fluff batt. The drying step may be accomplished by exposing the dry laid fluff batt to atmospheric air on the traveling perforated screen or other type of dry laying equipment and the fibers will be unrestricted due to the nature of the loose fluff batt form thereon.

10 Thus, it may be seen, that when the fibers are dried in any of the various ways discussed above, their natural kinking and twisting characteristics will be utilized so that the fibers will kink and twist and form hooks and bends which will interlock with hooks and bends of other fibers to form a lightly or loosely bonded fluff batt which has markedly improved strength and bulk. These batts of kinked and twisted interlocked fibers may be utilized in any of the above discussed products heretofore utilizing fluff batts of fibers with improved results.

20 In the specification, there has been set forth preferred embodiments of this invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers which is characterized by improved strength and bulk, said process comprising the steps of providing fibrous pulp material having a predetermined moisture content and comprising individual fibers having kinking and twisting characteristics when dried in an unrestricted state, fiberizing the wet pulp material to separate the individual fibers while maintaining the individual fibers separate from each other, drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other, and dry laying the fibers to form a low density fluff batt.

2. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in claim 1, in which said step of drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other comprises drying during the step of fiberizing the wet pulp material.

3. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in claim 2, in which said drying step comprises forcing hot air at a temperature of about 400°F through said fibers.

4. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which said step of drying the separated individual fibers in an unrestricted state while allowing the fibers to kink and twist for lightly bonding and interlocking with each other comprises drying during the step of dry laying the fibers to form a low density batt by subjecting the fibers to atmospheric air for a predetermined period of time.

5. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which said step of dry laying the fibers to form a low density batt comprises air laying the separated fibers on a perforated screen.

6. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which said step of dry laying the fibers to form a low density batt comprises carding of the separated fibers in a carding machine.

7. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 6, in which said carding step includes blending in other fibers with the fiberized pulp material.

8. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which the step of providing fibrous pulp material comprises providing fibrous pulp material selected from the group consisting of wood, cotton, linters, flax, hemp, ramie, bagasse and esparto.

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9. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which said step of providing fibrous pulp material comprises providing bleached fibrous pulp material having better kinking and twisting characteristics when dried in an unrestricted state.

10. A process for producing a low density, loosely bonded fluff batt of individual, kinked and interlocked fibers, as set forth in Claim 1, in which said step of fiberizing the wet pulp material comprises subjecting the wet pulp material to jets of fluid.

